sort, and these with poor pegs, are formed in darkness. Even if a thallus raised in darkness be afterward lighted, it forms no divergent rhizoids; and if such a thallus after being cut off regenerates itself, the new part forms none; the power once lost seems finally gone. Rhizoids cut off are not regenerated, but new ones are formed, either from surface cells of the thallus or from a cell internal to the first rhizoid-producing cell, in which case the new one grows through the old, as previously reported by KNY, DIXON, and others. WEINERT finds that small pegs occur even in true divergent rhizoids, which indicates to the reviewer that the possession of rhizoids of two kinds has been overvalued as a marchantiaceous character, for example in the case of Monoclea.

While the formation of rhizoids on the under side of gemmae is promoted by gravity, the hairs themselves are not geotropic, but are highly sensitive to light, being negatively phototropic even in weak red light, but strangely enough, not in blue light. The divergent rhizoids of the thallus are very slightly phototropic (negative). The appressed rhizoids show no tropisms.—C. R. B.

The origin of Oenothera gigas.—GATES[22] has investigated the relation of the number of chromosomes in *Oenothera gigas* to its size. This mutant from *O. Lamarckiana* has double the number of chromosomes (28) possessed by the parent form and by the other mutants examined. In every tissue examined, the cells of the mutant are conspicuously larger than those of the parent form, and the nuclei of the pollen mother cells during synapsis are about twice as large. The author suggests that increase in the size of nuclei and cells, consequent upon or coincident with the doubling of the chromosome number, and change in the relative dimensions of the cells in some cases, will account for all the differences between the two species. There is no evidence of the r esence of new or additional unit characters in *O. gigas*. It is concluded that the facts strongly support the view of the independence and genetic continuity of the chromosomes, whatever may be their rôle in heredity. It is suggested as most probable that the double number of chromosomes in *O. gigas* originated soon after fertilization, by the failure of a nucleus to complete its division after the chromosomes had divided. This doubling of the number of chromosomes, the author thinks, "cannot be a common method of species formation, and bear no necessary relation to the general processes of evolution in the group." He speaks of it rather as an incident mong evolutionary phenomena.—J. M. C.

Farm water supplies.—The Bureau of Plant Industry has been cooperating with the Minnesota State Board of Health in an investigation of the farm water supplies of that state, and a report by KELLERMAN and WHITTAKER has now been published.[23] Numerous cases and their details are presented, classified under

[22] GATES, REGINALD RUGGLES, The stature and chromosomes of *Oenothera gigas* DeVries. Archiv. für Zellforschung **3**:525–552. 1909.

[23] KELLERMAN, KARL F., AND WHITTAKER, H. A., Farm water supplies of Minnesota. Bull. 154, Bur. Pl. Ind., U. S. Depart. Agric. pp. 89. *figs. 73.* 1909.

the following headings: dug wells, bored wells, drilled wells, driven wells, springs, rivers, surface reservoirs, and cisterns. Some of the general conclusions are as follows: Both farm and city are suffering from the careless management of rural sanitation. Exhaustive data upon 79 carefully selected and representative rural water supplies show that 20 were good and 59 polluted, usually because of careless or ignorant management. Some of the polluted wells are so located that even extreme care would not make them safe, but a large majority of them could be made safe. The rivers, surface reservoirs, and cisterns are all polluted, and it is doubtful whether satisfactory supplies can be secured for farm use from such sources, except by disinfection. During the investigation 23 of the farms examined showed a record of typhoid fever. It is stated that "the protection of farm supplies by common-sense methods, obvious to anyone who will try to discover the dangers incident to his own water supply, would render safe the majority of the farm supplies which are now polluted."—J. M. C.

Ferments of resting seeds.—Miss WHITE[24] has shown that the enzymes present in seeds of wheat, maize, barley, oats, and rye retain their activity long after the power of germination of the seeds has disappeared. Diastatic and proteolytic enzymes were shown to be present in wheat after twenty years of storage, and in oats, rye, and barley after eight to ten years of storage, although the seeds had lost their power of germinating. The enzymes persisted apparently unaffected by the long period of storage. The resistance of the enzymes to heat was also tested. In a moist condition all the enzymes are destroyed at 100°, but in a dry state they can resist higher temperatures. Pepsin was destroyed in one hour at 124°, erepsin in one hour at 124°–128°, and diastase at 124°–131.° Both as to duration of time and effects of heat the enzymes are more persistent than the power of germination, showing that failure to germinate is not necessarily correlated with loss of enzymes. In the final part of the paper the respiratory activity of resting seeds is taken up. Many air-dried seeds give off appreciable quantities of carbon dioxid, but others show no respiration. When seeds are moderately desiccated at 45° all respiration ceases.—H. HASSELBRING.

Position of chloroplasts.—SENN'S continued investigations[25] on some details of the position of chloroplasts offer opportunity to call attention to his independently published work,[26] which was not received by the GAZETTE. In his last contribution, after alluding to certain adverse criticisms on his former results, he reports investigations on the winter position of the chloroplasts in the palisade cells of winter-green foliage. He concludes that the heaping up of the

[24] WHITE, MISS JEAN, The ferments and latent life of resting seeds. Proc. Roy. Soc. B **81**:417–442. 1909.

[25] SENN, G., Weitere Untersuchungen über die Gestalts- und Lageveränderung der Chromatophoren. Ber. Deutsch. Bot. Gesells. **27**:(12)–(27). 1909.

[26] ———, Die Gestalts- und Lageveränderung der Pflanzen-Chromatophoren. Leipzig: Wilhelm Engelmann. 1908.